

SEASONAL HISTORY AND HOST PLANTS OF THE ANT MIMIC  
*BARBERIELLA FORMICOIDES* POPPIUS, WITH DESCRIPTION  
OF THE FIFTH-INSTAR (HEMIPTERA: MIRIDAE)

A. G. WHEELER, JR. AND THOMAS J. HENRY

Bureau of Plant Industry, Pennsylvania Department of Agriculture, Harrisburg, Pennsylvania 17120.

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*Abstract.*—The first host records are provided for the ant-mimetic mirid *BarberIELla formicoides* Poppius, generally considered a rare species. Seasonal history on apple and crabapple is summarized, and notes are given on behavior, association with ants, and food habits. The fifth-instar nymph is described and illustrated.

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*BarberIELla formicoides* Poppius is an ant-mimetic mirid belonging to the subfamily Mirinae, tribe Herdoniini. This interesting species has been considered rare, and no host plant has been recorded. Nearly all treatment of this mirid in the literature reflects an uncertain taxonomic status.

During 1974-75 we observed a large population of *B. formicoides* on crabapple, *Malus* sp., in Dauphin Co., near Harrisburg in central Pennsylvania and collected this species in 8 additional counties. In this paper we summarize our data on seasonal history and host plants; present somewhat fragmentary and anecdotal information on searching behavior, food habits, and association with ants; and describe and illustrate the fifth-instar nymph.

*Taxonomic history.*—Poppius (1914) described the new ant-mimetic genus *BarberIELla* with *B. formicoides* as the only included species. His description was based on a single female collected at Brownsville, Texas, on May 25, 1904; this probably was the specimen illustrated in color by Poppius (1921).

Knight (1923) described *B. apicalis* from Long Island and Staten Island, New York, noting that this striking ant mimic resembled a large species of the mirid genus *Pilophorus*. Blatchley (1926a) then described the new species *brimleyi*, in the genus *Pilophorus*, from North Carolina. Knight (1927) examined Blatchley's *brimleyi* and considered this species conspecific with *apicalis*. Blatchley (1928a, 1928b) explained his reasons for overlooking Poppius' and Knight's descriptions and, in 1930, accepted Knight's (1929) conclusion.

More recently, Carvalho and Ferreira (1973) treated *B. apicalis* as distinct from *B. formicoides*, at the time known only from Texas. However, Carvalho and Schaffner (1975) examined male genitalia of the taxa described by Poppius, Knight, and Blatchley and concluded that both *B. apicalis* and *B. brimleyi* were junior synonyms of *B. formicoides* (although southern specimens tend to be more reddish-brown and, as we have found, more densely pubescent than northern examples). Including records for all 3 names, this species has been reported from Illinois, Georgia, Mississippi, Missouri, New York, North Carolina, Pennsylvania, Texas, and Mexico (Carvalho, 1959; Carvalho and Schaffner, 1975; Henry and Smith, 1979). A new record is Arkansas, Craighead Co., Aug. 28, 1957, E. Nickerson (USNM).

Seasonal history and host plants.—On July 17, 1974, while beating branches of crabapple trees in a roadside planting near Harrisburg (Dauphin Co.), Pa., we collected several fourth- and fifth-instar mirid nymphs that were distinguishable from ants only after careful scrutiny. The nymphs strongly resembled the black ant, *Formica subsericea* Say, collected with the mirids. When reared to maturity in the laboratory, the species was identified as *B. formicoides*. Additional collecting from the more than 20 ornamental crabapples that lined both sides of the road revealed about 25–30 late instars of the “rare” species. We then returned to a group of pin oaks, *Quercus palustris* Muenchh., in Harrisburg where we had taken our only previous specimens of this ant mimic, two males, on July 18, 1973. No specimens of *B. formicoides* were found after extensive collecting and observation, but several late instars were taken on trunks of apple trees, *Malus sylvestris* Miller, growing near the pin oaks.

Further collecting in the Harrisburg area showed that instars III–V were common from mid- to late July. The first adult was collected on July 19 from the large population on trunks of crabapple, but the majority of the population consisted of late instars until the last week in July. A fifth instar was collected from this population as late as August 6. Our latest record of nymphs is a fifth instar taken on August 15 in Lancaster Co. Adults were present on apple and crabapple in the Harrisburg area until the last week in August.

In 1975 the crabapples that had harbored large numbers of *B. formicoides* the previous year were sampled weekly beginning in mid-May. No nymphs were beaten from main branches or observed on trunks until a second instar was found on July 3, suggesting that overwintering eggs had begun to hatch in late June. Third instars were collected on July 10, and fourth instars on July 18. Development of populations in the Harrisburg area appeared to be somewhat later than in 1974; adults were not collected until July 28.

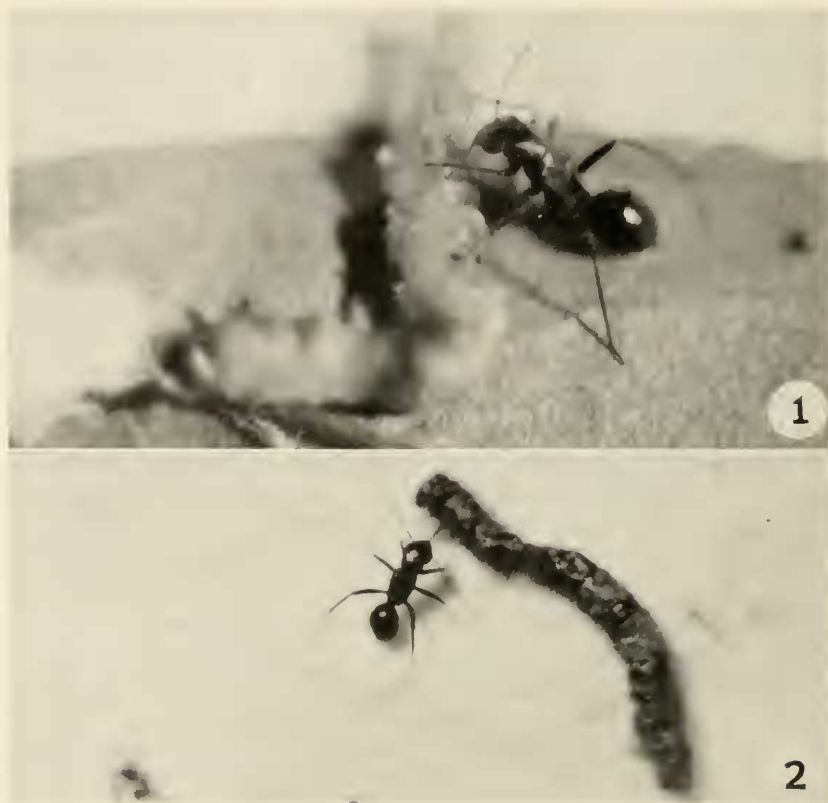
Our observations on seasonal history, plus specimens in museum collections and records from the literature, indicate that *B. formicoides* is a uni-

voltine, relatively late-appearing species. The earliest record of adults in the eastern states is June 24 in Wake Co., North Carolina (USNM), and June 27 at Shawneetown, Illinois, near the Kentucky border (Knight, 1941). All other eastern records are for July and August (Knight, 1923; Blatchley, 1926b; Froeschner, 1949).

Apple (12 localities) and crabapple (9) were the principal host plants of *B. formicoides* in Pennsylvania. Populations of the mirid were found on several ornamental cultivars of crabapple in nurseries and landscape plantings and on unsprayed apple trees in yards, fields, and along roadsides. A small population was present in an Adams Co. orchard in the principal apple-growing region of southcentral Pennsylvania. Typically only one or two specimens were found on trunks or beaten from branches of a single tree, but on crabapple at the main study site near Harrisburg ten nymphs and adults were taken on a single tree on July 21, with 3.2 the average number encountered in a five-tree sample. Although we collected nearly throughout the state on apple and crabapple, we encountered *B. formicoides* only in nine southcentral and southeastern counties: Adams, Berks, Chester, Cumberland, Dauphin, Juniata, Lancaster, Lebanon, Montgomery, and York.

When *B. formicoides* was taken on other plant species, apple or crabapple trees usually were growing nearby. In such situations we collected a few adults on *Viburnum* spp. in two nurseries and on the rosaceous tree *Mespilus germanica* "Medlar" in an arboretum. One adult was beaten from a hedge of *Amorpha fruticosa* L. with no rosaceous plants growing in the vicinity. In a mixed planting of fruit trees in York Co., nymphs were common not only on apple but also on peach, pear, and persimmon. Although no host associations have been recorded in the literature, we have examined specimens in the USNM collection that had been taken on catalpa (Raleigh, N.C., July 9, 1948), peach (Bangs, Texas, May 20, 1938), and willow (Craighead Co., Ark., Aug. 28, 1957). This mirid also has been taken at light (Wake Co., N.C., June 24, 1949).

Behavior and food habits.—*Barberiella formicoides* nymphs and adults most often were observed running erratically up and down trunks of apple and crabapple where they strongly resemble ants in both form and behavior. In fact, this mirid appeared more common on ant-infested trunks, and we often located populations by first finding the ants. Early stage nymphs closely resemble the brown ant *Lasius neoniger* Emery, while later instars are somewhat darker and look more like the larger black ants commonly found on the host trunks, *Camponotus nearcticus* Emery and *Formica subsericea* Say. The association with the ants, if any, was not determined. The relationship appears not to be an aggressive one; when nymphs and adults encountered ants on tree trunks, they quickly retreated in all cases. It is possible that *B. formicoides* is part of a mullerian mimicry complex with

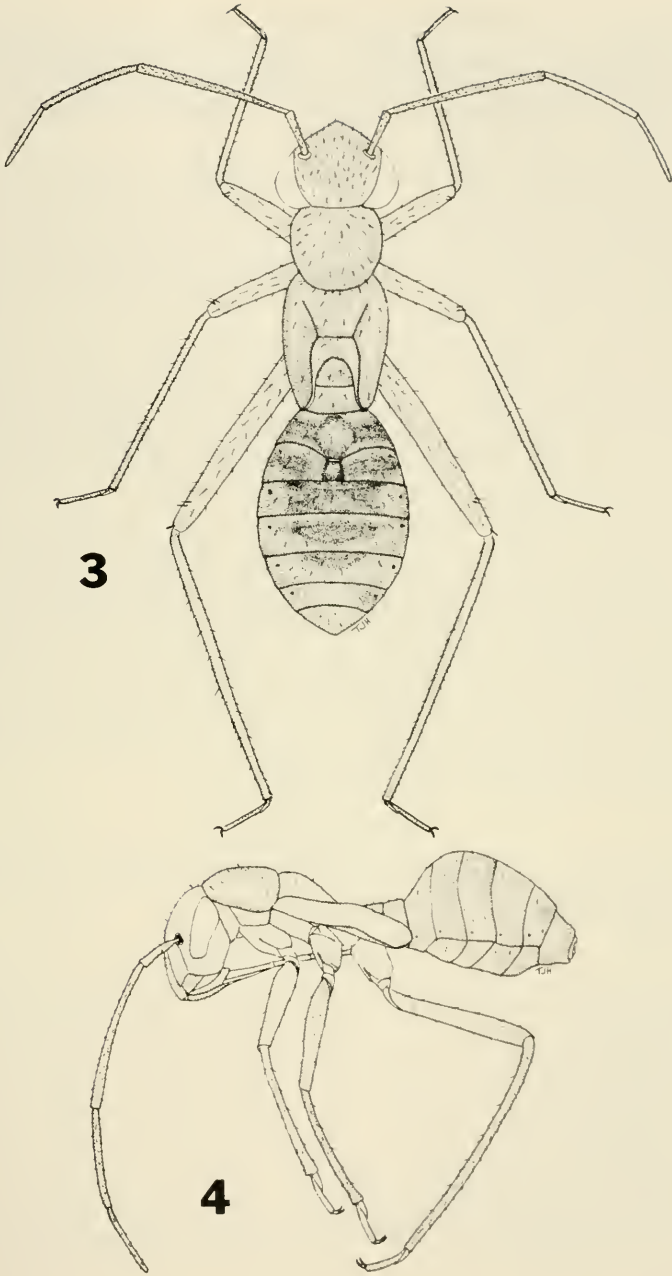


Figs. 1-2. *Barberiella formicoides*, fifth instars feeding on dead caterpillars. 1. Noctuid. 2. Geometrid.

*Paraxenetus guttulosus* (Uhler) and *Pilophorus australis* Knight, ant-mimetic mirids frequently taken with *Barberiella*. In general, however, the possible interaction between ant-mimetic mirids and co-occurring ants has defied elucidation (Kullenberg, 1944).

As nymphs and adults move quickly on trunks of host trees, the antennae are usually in constant motion, tapping the surface. At irregular intervals the proboscis is probed into bark crevices and flaps, bud scars, and lenticels. Less often nymphs and adults searched over main branches, leaves, fruit, and water sprouts. Several adults made short flights from water sprouts and trunks to upper branches. Rapid searching was sometimes interrupted by periods of near motionlessness, except for antennal waving, lasting from a few seconds to several minutes.

We could not confirm feeding in the field, but the searching behavior suggested a predacious habit. Populations of *B. formicoides* frequently were



Figs. 3-4. *Barberiella formicoides*, fifth instar. 3, Dorsal view. 4, Lateral view.

found on apple trees heavily infested with tetranychid mites. Eggs of brown mite, *Bryobia rubrioculus* (Scheuten), were discovered in bark fissures that had been probed by *B. formicoides*. A nymph also probed a microlepidopteran pupal case; another was found within a curled leaf infested with apple aphid, *Aphis pomi* (DeGeer).

In the laboratory nymphs readily fed on squashed noctuid and geometrid larvae collected from crabapple (Figs. 1, 2). A nymph was observed to prey on a leafhopper nymph taken on crabapple and another fed on larvae of the greenhouse whitefly, *Trialeurodes vaporariorum* (Westwood). An adult fed on three *Aphis pomi* nymphs but avoided alate forms of the aphid.

Description of fifth instar (Figs. 3, 4).—Length 3.58–4.10 mm; strongly formicoid, uniformly dark brown to fuscous; sparsely, but evenly, clothed with stiff, erect, pale setae. Head: Length 1.20 mm, width across eyes 1.16 mm, wider than anterior margin of pronotum, vertex 0.70 mm, impunctate, posterior margin weakly carinate, front moderately convex, median slightly grooved. Rostrum: Length 1.76 mm, reaching middle of metacoxae. Antennae: Fuscous, clothed with fine recumbent setae; segment I, length 0.40 mm; II, 1.66 mm; III, 1.00 mm; IV, 0.66 mm. Pronotum: Length 0.84 mm, median width 0.96 mm, anterior and posterior angles rounded, uniformly fuscous, median line somewhat paler, impunctate with a pair of punctures at middle on either side of median, area representative of calli along anterior margin weakly depressed; wing pads long, reaching base of 3rd abdominal segment. Abdomen fuscous, bulbous, 1st and 2nd segments narrowed into antlike pedicel, segment III widened dorsally, extending posteriorly along median line. Venter and legs uniformly fuscous.

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